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A total of 102 children (17 from each of the kindergarten, first, and second grades and of two disparate socioeconomic backgrounds) were administered a series of tasks involving verbal recall. The purpose of this testing was to compare the verbal recall ability of children of different ages and socioeconomic status. The verbal material was read to the child. At the completion of each item, the child was asked to recall the verbal material in the order given. Task I consisted of CVC trigrams. Task 2 consisted of nouns. Tasks 3 and 4 consisted of sentences, meaningless and meaningful, respectively. The language skills necessary to perform the tasks increased, theoretically, from Task 1 to Task 4. The hypotheses that children remember more verbal units as language habits can be more fully utilized and that older children remember more units than younger children on the higher level tasks and that there is an interaction between socioeconomic status and performance on the tasks were not confirmed. A prediction of a cumulative deficit between socioeconomic groups with increasing age was rejected. (WD)

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THE AUDITORY MEMORY OF CHILDREN FROM DIFFERENT SOCIO-ECONOMIC BACKGROUNDS[1]

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Previous research has demonstrated that children of lower socio-economic status perform an auditory memory task as well as those of higher status. The present study sought to replicate the earlier research with children from widely diverse backgrounds.

Previous findings were not confirmed. Children of high and low socio-economic status performed differently on the memory tasks used here, but there was no interaction between the language skills required by the task and the socio-economic status of the children. Children from different backgrounds became more similar as they grew older but this trend was not significant.

When they compared the performance of children of diverse socio-economic status on a series of verbal tasks, Barritt, Semmel, & Weener (1966;1967a) found differences between high and low SES groups on scales requiring vocabulary and syntactic skills. However, there was no significant difference between groups on an auditory memory scale. Since auditory memory is part of many operational definitions of intelligence, it was surprising and paradoxical that this scale did not reinforce the general image of deficit for the children of low socio-economic (LSES) status. In a second study, an Immediate Memory Test (see Table 1) was used to compare the auditory memory capacity of the same group of children (Barritt, Semmel, & Weener, 1967b). This study, too, revealed no over-all differences in auditory memory capacity for the two groups.

Insert Table 1 About Here

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The purpose of the investigation being reported here was to compare the verbal recall ability of children from high and low socio-economic backgrounds, with the help of materials calling for different levels of language skill. Essentially it was a repetition of the second study just mentioned, with the same stimulus materials but with new groups of children from markedly different backgrounds.

Method

Seventeen children each from the kindergarten, first, and second grades and of two disparate socio-economic backgrounds were subjects in this study. The total number of subjects was 102.

The children belonging to the high socio-economic status group (HSES) attended the university school in an upper-middle class suburban community where the median income is over $7,000. At least one of the parents of all of these children had attended college. The fathers of children in this group had on the average completed more than six years (6.31 years) of study beyond high school.

The children of lower socio-economic status (LSES) in the sample attended a public school in a suburban community close to a large city. The median income in this community of primarily blue collar workers is approximately $5,000. The public school attended by these children was made up entirely of Negro children because of the housing patterns in the community. For this group, no record of either parent's educational level was available. However, it was possible to extrapolate from the stated occupation of each father what educational level was required to perform the work. By that criterion, none of the fathers was doing work that would require more than a high school diploma.

All of the kindergarten, first, and second-grade children at the university school (HSES) were included in this study. An equal number of kindergarten, first, and second graders were randomly selected from the public school in the LSES community.

Procedure. Each child was interviewed individually by a white female who conducted all of the experimental sessions in a small private room.

Instructions were read after the experimenter was confident that the child was at ease. The instructions included several test tasks to make sure that the child understood the procedure. The four experimental lists are reproduced in Table 1.

The test instrument had been used in an earlier study (Barritt, Semmel, & Weener, 1967). The tasks were designed to measure auditory memory at four levels of verbal structure. Items in the first task level consisted of CVC trigrams selected at random from the Underwood and Schulz lists (1960) with meaningfulness ratings in the 30-70 range. The second task level consisted of nouns selected randomly without replacement from the 500 most frequent words in the original Thorndike count, excluding common homonyms (Thorndike & Lorge, 1944).

The third and fourth task levels contained sentences; corresponding sentences on the two levels had the same grammatical structure, but the Level 3 sentences were meaningless (anomalous) and the Level 4 ones were meaningful. The anomalous (Level 3) sentences were generated by classifying the word pool from Level 4 by form class and then selecting words randomly to fit the appropriate frames at Level 3.

The entire auditory memory test was recorded and presented to the subjects on a MagMatic Tape Repeater. The words in Levels 1 and 2 were read as a list at the rate of 1 unit per second. The sentences of Levels 3 and 4 were read with normal sentence inflection at the rate of 3 words per second. Lists were presented in four different orders based on a balanced 4 x 4 Latin square. Each subject was asked to recall the words in proper order. Only one trial was given for each item and ceiling was established at two incorrect items in each list. The subject's responses were recorded and scored later as an immediate memory span task. A subject's score for each level was the number of words correctly recalled in the last item.

Hypotheses

It was predicted that:

Hypothesis 1

Children would recall more information to the degree that the lists called into play semantic and/or syntactic language habits. Thus, it should be possible for children to recall more units when the material was presented in sentence form than when there were no contextual constraints between items in the list.

Hypothesis 2

Older children would recall more units of information than younger children.

Hypothesis 3

The disparity between older and younger children would become greater as the nature of the tasks permitted the greater use of language skills to aid in recall.

Thus, older and younger children should be more alike in recall ability for nonsense words than for meaningful sentences.

Hypothesis 4

Children from different socio-economic backgrounds would be increasingly dissimilar in auditory memory capacity as previously learned language habits could be increasingly used to aid in recall. Thus, children from the HSES group would remember more of the sentence material than their LSES counterparts, but the performance of the two groups would be more similar in recall of unstructured material.

Hypothesis 5

The predicted interaction between task levels and SES backgrounds would be greater for older than for younger children. In other words, a cumulative deficit was predicted between socio-economic groups with increasing age. This deficit should manifest itself most clearly in older children at Levels 3 and 4 where language habits could be most helpful.

Results

The raw score means and standard deviations for each of the groups at the four task levels are presented in Table 2. It should be noted that the standard deviations are markedly different across the four task levels. The largest variance is 36 times the smallest. Therefore, a log transformation was performed upon the raw scores to reduce the heterogeneity of variance.

Insert Table 2 About Here

A three-way ANOVA was then performed upon the transformed data with the two levels of socio-economic status, the three grades and the

four task levels serving as factors (Edwards, 1960, p. 224). All of the main effects were significant whereas none of the interactions were. The F ratios were 21.89 $p < .01$ for socio-economic status, 4.08 $p < .05$ for grade level, and 371.20 $p < .01$ for task levels.

The large F ratio for task levels tended to confirm Hypothesis 1, that children remember more units as language habits can be more fully utilized. Striking increases are achieved in the mean scores from one level to the next as language skill supplements memory capacity to increase the number of units recalled.

The second hypothesis was confirmed by the significant main effect observed for grade levels (see Figure 1). Older children remember more units than younger children.

Insert Figure 1 About Here

The third prediction, that older children will do relatively better at Task levels 3 and 4 than at 1 and 2, posits an interaction between task levels and grades. This prediction was not confirmed, even though the graph of the trends in Figure 1 seems to support the prediction.

Hypothesis 4 posits an interaction between socio-economic status and task levels. This hypothesis was not confirmed. There is no significant difference in the slope of the trends across task levels for LSES and HSES children (see Figure 2). The significant main effect for socio-economic status, coupled with the lack of a significant interaction with task levels, suggests that the differences between LSES and HSES children in memory capacity remains relatively constant as the nature of the material to be recalled changes.

Insert Figure 2 About Here

The absence of a significant three-way interaction between socio-economic status, school grade, and task level indicates that the trends of increase from Levels 1 to 4 is the same for the three grade groups from different socio-economic backgrounds. Hypothesis 5 must be rejected.

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Figures 3, 4 and 5 chart the performance, by school grade, of the two SES groups at each of the four task levels. Even if the 3-way interaction had reached a level of statistical significance, the effect would have been attributable to the greater deficits at Levels 3 and 4 of younger rather than older SES children. This trend contradicts predictions but does match other findings for similar groups tested with PA learning tasks (Semler & Iscoe, 1963; Rohwrer, 1967).

Insert Figures 3, 4, & 5 About Here

The major focus of the present study was on the prediction that the auditory memory of groups of different socio-economic status would be affected differently by the different levels of the test material. The results fail to confirm this prediction. On the contrary, children from different socio-economic backgrounds seem to use similar strategies for processing information at each of the levels. In spite of the lack of significant interactions, this trend seems to be truer of 7-year-olds than of 5- and 6-year-olds.

Footnote

[1]The research reported herein was performed in part pursuant to Contract OEC-3-6-061784-0508 with the U. S. Department of Health, Education, and Welfare, Office of Education, under the provisions of P. L. 83-531, Cooperative Research, and the provisions of Title VI, P. L. 85-864, as amended. This research report is one of several which have been submitted to the Office of Education as Studies in Language and Language Behavior, Progress Report VII, September 1, 1968.

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Fig. 1. Average raw scores for kindergarten, first, and second grade children at four task levels.

Fig. 2. Average raw scores for high and low socio-economic status groups at four task levels for grades kindergarten, first and second combined.

Fig. 3. Average raw scores for kindergarten children from high and low SES Groups.

Fig. 4. Average raw scores for first-grade children from high and low SES Groups.

Fig. 5. Average raw scores for second-grade children from high and low SES Groups.

Table 1

Immediate Memory Test

Level 1

Nonsense Syllables

Item 1:	cax	sab				
Item 2:	dup	mav	tus			
Item 3:	kuv	ruf	fup	nid		
Item 4:	mub	fip	gak	hem	eib	
Item 5:	yod	tud	wib	paf	nus	suf

Pronunciation key: a as in bat, o as in bet, u as in but, o as in go, i as in bit.

Level 2

Item 1:	watch	hill					
Item 2:	gold	church	land				
Item 3:	night	king	sun	school			
Item 4:	hand	wind	house	corn	bed		
Item 5:	ball	rain	world	street	year	arm	
Item 6:	wall	mild	word	stone	tree	friend	food
Item 7:	man	air	light	sound	bud	box	death	place

Level 3

Item 1: A truck opened today.

Item 2: Today his man has black fire.

Item 3: The little curly trees ran at a door.

Item 4: A path for new black tails looked down the hand.

Item 5: On the girls she ran over the big friend with some umbrella.

Item 6: The snowman and garden lady, a teacher went in and down as they flew.

Item 7: Old cow and his street slowly jumped up a red kitten to a black, new book.

Table 1 continued

Level 4

Item 1:	The door opened slowly.
Item 2:	Today all pigs have curly tails.
Item 3:	A little old lady ran down the street.
Item 4:	A man on his red truck looked at the fire.
Item 5.	Over the trees she flew with a black umbrella in her hand.
Item 6:	The snowman and his friend, the cow, jumped up and down as they sang.
Item 7:	His kitten and my turtle slowly walked down the garden path to the big, red, barn.
Item 8:	The boys and girls went with their teacher to buy some books about pets for their new school.

Table 2

Raw Score Means and Standard Deviations at Four Task Levels for High and Low Socio-economic Groups at Three Grade Levels

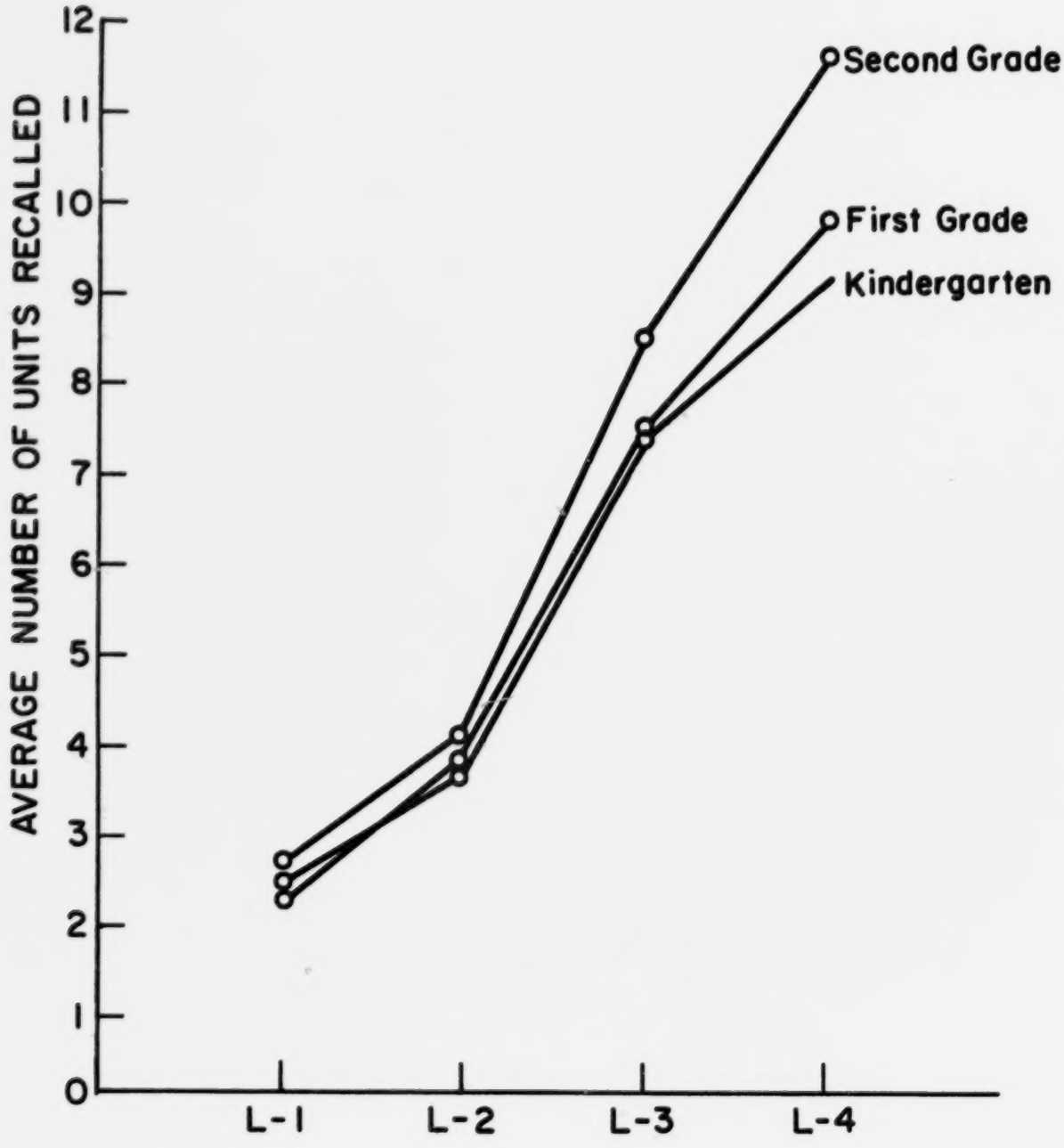
		L-1		L-2		L-3		L-4	
		$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S	$\bar{X}$	S
High SES	Grade K N=17	2.82	.71	3.88	.58	8.59	1.50	10.12	2.61
	Grade 1 N=17	2.29	.71	3.82	.58	7.77	1.50	10.94	2.61
	Grade 2 N=17	3.06	.80	4.35	.76	9.06	1.55	11.77	1.93
Low SES	Grade K N=17	1.82	1.15	3.18	.98	5.88	2.78	7.88	2.42
	Grade 1 N=17	1.77	1.31	3.53	.70	6.94	2.75	8.35	3.51
	Grade 2 N=17	2.06	1.43	3.47	.61	7.65	2.59	11.18	1.20

L-1 Level 1 - nonsense words

L-2 Level 2 - common nouns

L-3 Level 3 - anomalous sentences

L-4 Level 4 - meaningful sentences


AVERAGE NUMBER OF UNITS RECALLED
0
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8
9
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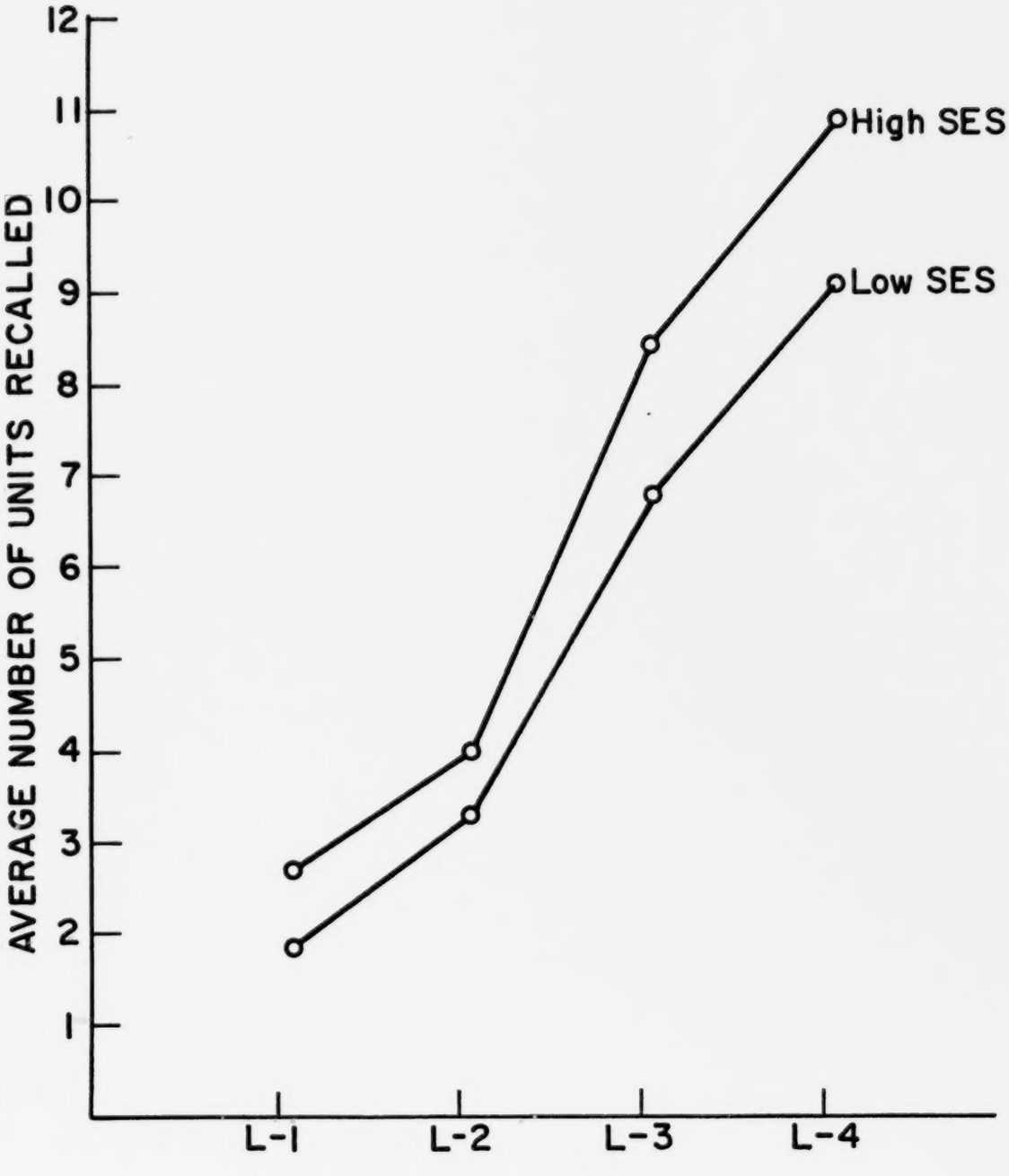
11
12
L-1
L-2
L-3
L-4
Second Grade
First Grade
Kindergarten

Figure 1


AVERAGE NUMBER OF UNITS RECALLED
12
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High SES
Low SES
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L-4

Figure 2

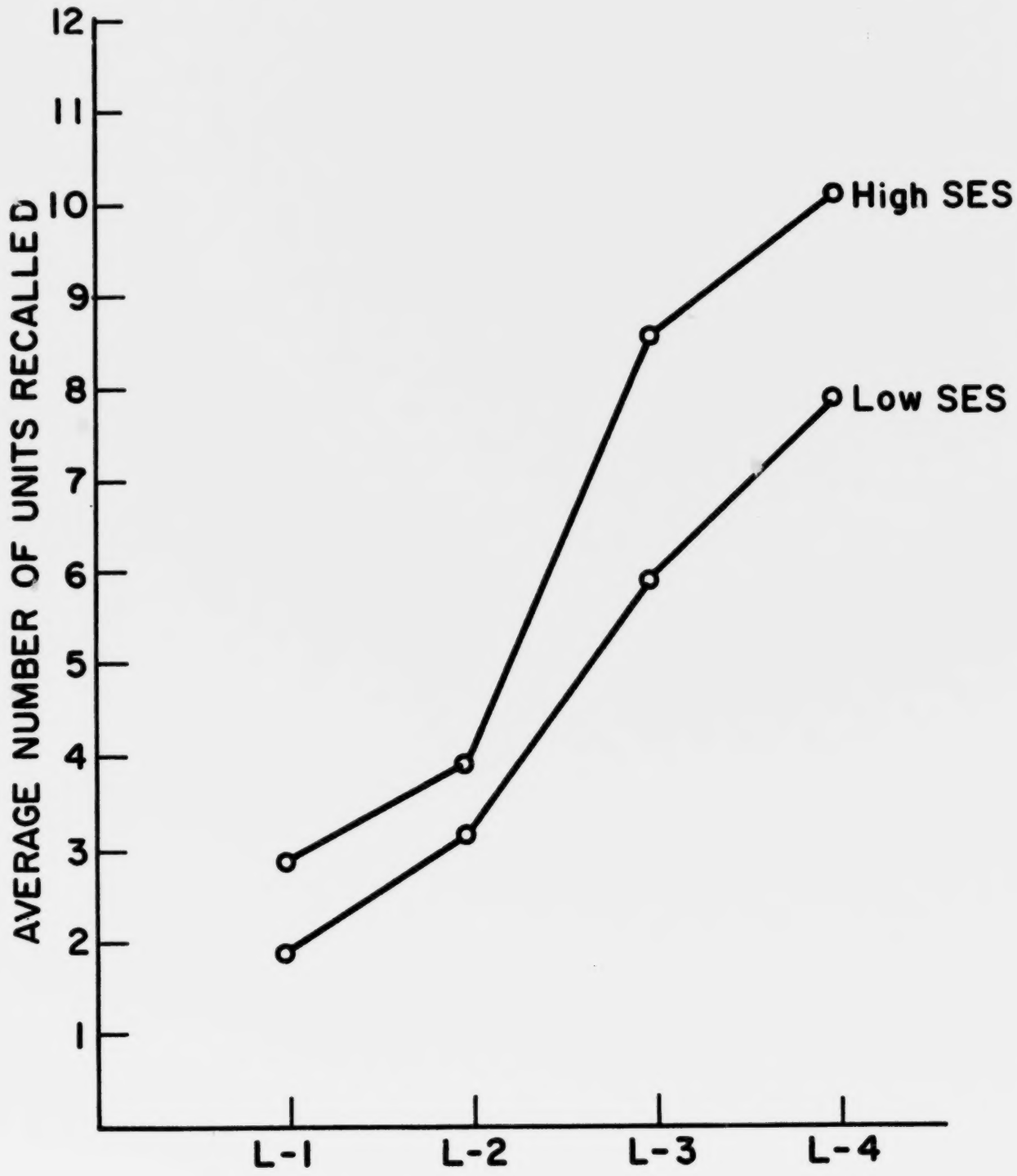
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Figure 3

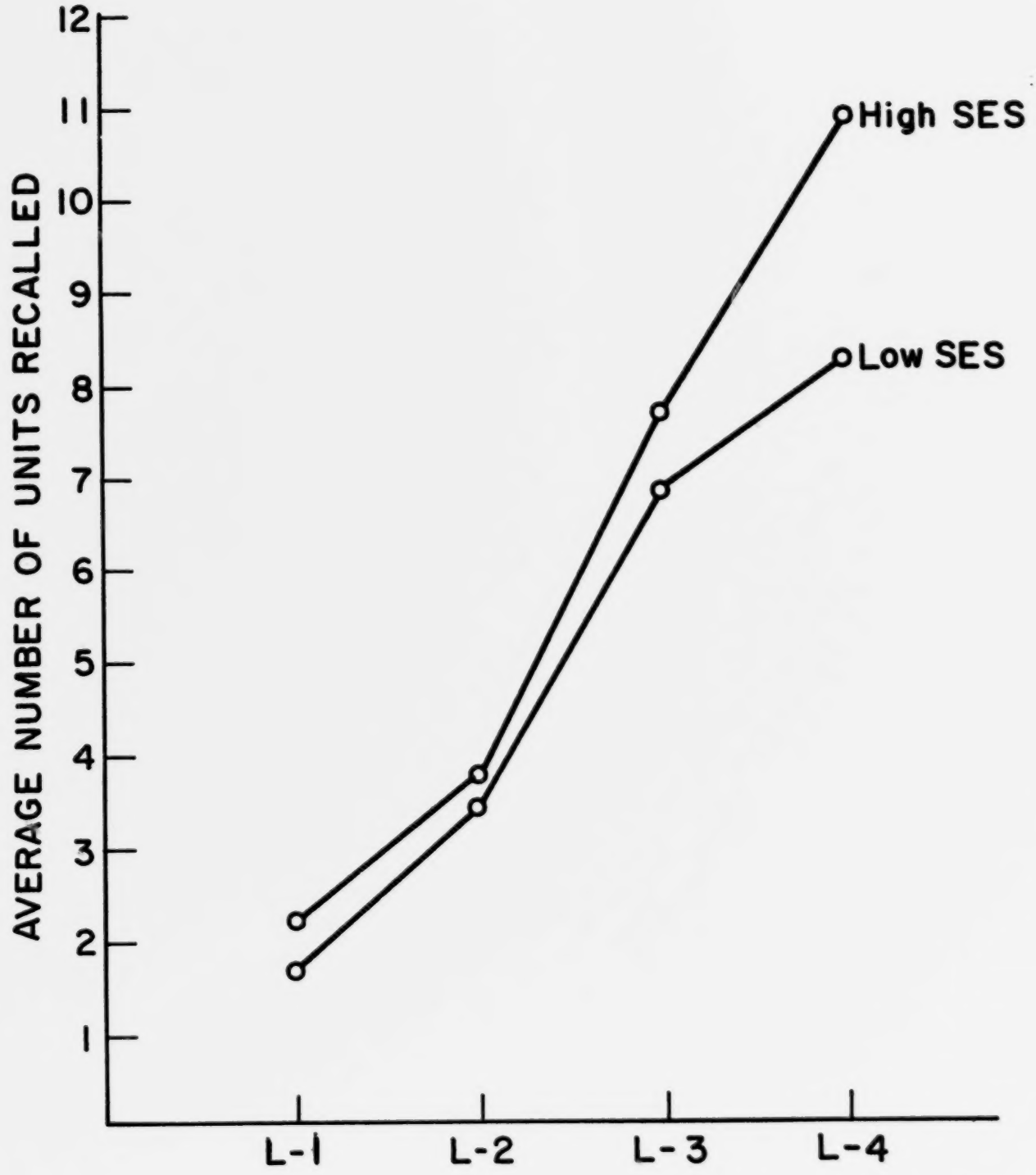
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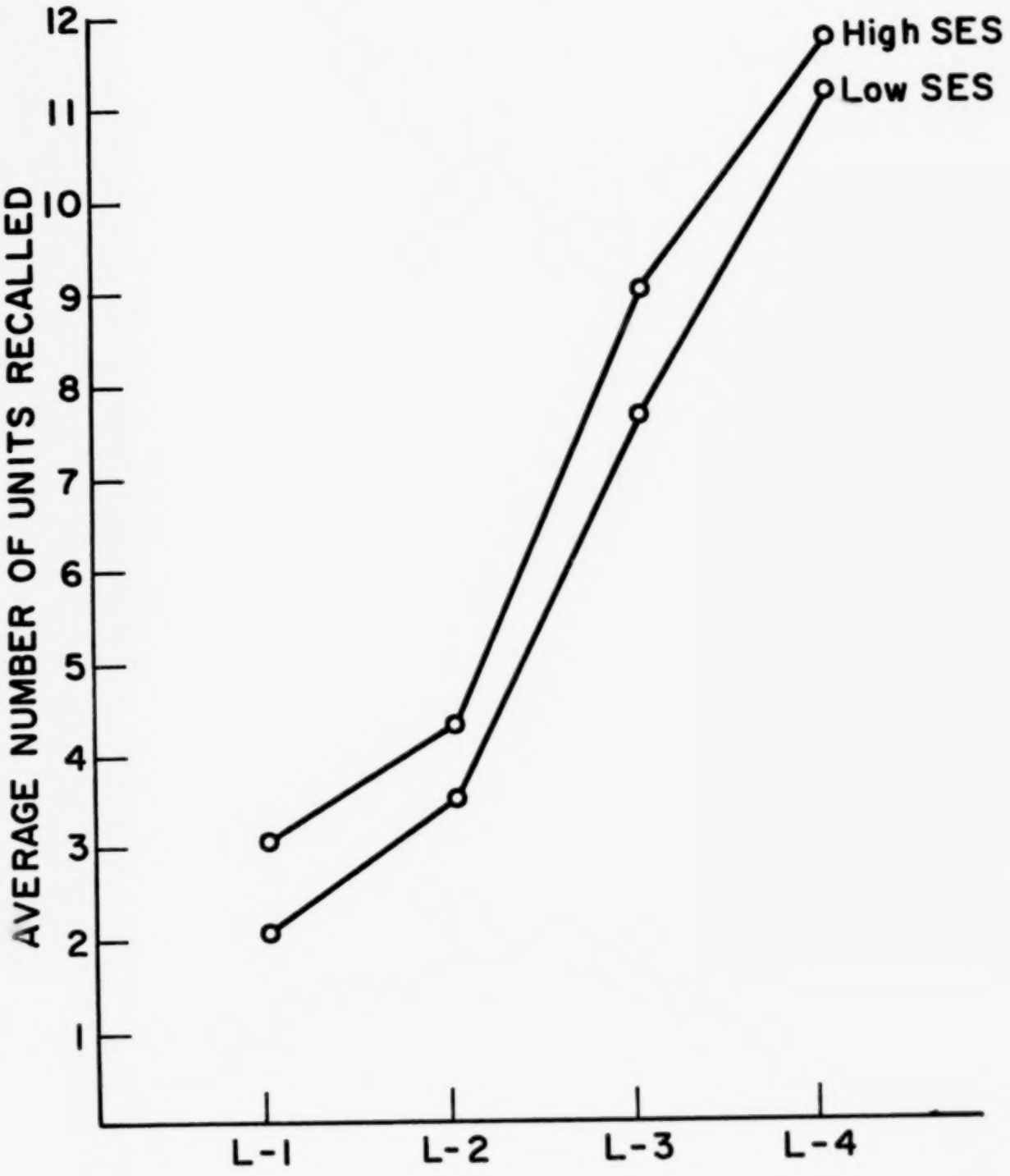
Figure 4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L-3
L-4
High SES
Low SES

Figure 5